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Published to advance the Science of cold-blooded vertebrates

ON THE DIFFERENTIAL CHARACTERS BETWEEN *MUSTELUS HENLEI* AND *MUSTELUS CALIFORNICUS*.

Mustelus henlei (Gill) is not commonly recognized on our coast, being passed over as *Mustelus californicus* which it strikingly resembles.

The fact that these two forms have been considered under separate genera, is perhaps somewhat responsible for their being confused by collectors. One naturally looks for greater differences than those that exist between these two, in species belonging to separate genera. Should the future, however, show that the young of *Mustelus henlei* is without the so-called placenta, it must perforce be considered generically different from *Mustelus californicus*.

The character of the teeth has been considered of sufficient weight for referring these species to different genera, but the dental differences between them are so small that a lens is necessary to distinguish them. The slight basal denticle in *Mustelus henlei* is not present on all of the teeth, and sometimes there is a slight blunt suggestion of this denticle in *Mustelus californicus*.

The distinguishing characters between these species is here pointed out hoping that the easy recognition and separation of the species may lead to a bet-

ter knowledge of their distribution and comparative abundance. At present we know only that *Mustelus californicus* is reported from San Francisco to the Gulf of California, but whether both species are included in this range, or whether *Mustelus henlei* is the commoner form in the northern part of it is uncertain.

Garman (Mem. Mus. Comp. Zool. XXXVI), distinguishes *Mustelus henlei* and presents a very good plate of it, but he does not separate it very well from *Mustelus californicus*.

I recently rather hastily examined Gill's type at the National Museum—a young specimen nine and a half inches in length, with the umbilical scar rather fresh, and compared it with the young of *Mustelus californicus* of similar size. I concluded that they were very doubtfully separable. Since then, however, I have had occasion to examine all of the adult specimens at Stanford University that I had supposed were referable to *Mustelus californicus*, and have found both of these species represented and rather easily separated.

In *Mustelus henlei* the base of the anal is even with, or only slightly posterior to, the base of the second dorsal. In *Mustelus californicus* the anal is behind the second dorsal, a distance nearly or quite equal to the long diameter of the eye.

In *Mustelus henlei* the dorsal is more anteriorly placed. The distance from its origin to the last gill opening is equal to the length of the snout, while in *Mustelus californicus* this distance is equal to two-thirds or three-fourths of the length of the head.

In *Mustelus henlei* the tips of the pectorals when laid close to the body reach at least to opposite the middle of the dorsal base, while in *Mustelus californicus* they scarcely reach to under the anterior fourth of the dorsal base.

In *Mustelus henlei* the sides of the mandible are slightly convex; in *Mustelus californicus* they are concave.

One may appreciate with the naked eye that the teeth of *Mustelus henlei* are somewhat sharper. With the aid of a lens, a slight basal cup may be seen on each side of most of the middle upper teeth, and on the outer side of the lateral upper teeth. These are scarcely developed on the lower teeth. In *Mustelus californicus* the teeth are smooth, blunt, and not at all cusped.

In *Mustelus henlei* each scale on the side of the body has a projecting spine at the tip, while at each side of it is a small basal spine. That is, the scale is tricuspid. In *Mustelus californicus* the edge of the scale is entire. A strong lens is necessary to show these characters.

Mustelus lunulatus, with which *Mustelus californicus* intermingles along the Lower California coast, has the fins much as in *Mustelus henlei*, and the teeth and mandible contour as in *Mustelus californicus*. It may be known from them at once by the lower lobe of the caudal projecting in a rather sharp angle. In the other two species the posterior edge of the caudal below the notch is regularly concave without the lower lobe being produced.

My material was:

Mustelus henlei. Three specimens from San Francisco, 15 to 26 inches long.

Mustelus californicus. Six specimens from 23 to 32 inches long. Four of them from San Diego, one from Ensenada, Lower California, and one from Magdalena Bay, L. C.

Mustelus lunulatus. Three specimens from 19 to 25 inches in length. One from Mazatlan, Mexico, and two from Panama.

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